REFORMER EXERCISE APPARATUS ANCHOR BAR ASSEMBLY

BACKGROUND OF THE INVENTION

Field of the Invention:

This invention relates generally to the field of exercise equipment in which a movable carriage is utilized to at least partially support a user's body, commonly referred to as a "reformer", and more particularly to a reformer having an adjustable spring anchor bar and carriage stop assembly.

Description of the Related Art:

Joseph H. Pilates, in U.S. Pat. No. 1,621,477, originally developed the concept of using a wheeled platform carriage connected to a resistance device such as a set of weights in conjunction with a stationary frame to provide a variable resistance against which a user could push with his/her feet or pull with the arms while in a sitting or recumbent position in order to exercise the major muscle groups of the user's trunk, legs and/or arms. Since that time many changes and improvements in the design of such an apparatus were developed by Joseph Pilates, and more recently, have been evolved by his students and others. U. S. Pat. No. 5,066,005 and my patents referred to above are representative of the current state of evolutionary development of these changes that have taken place since 1927.

The current conventional apparatus is commonly referred to as a "reformer" which includes a wheeled platform carriage which rides on a parallel rails on or forming part of a rectangular wooden or metal frame. The carriage is connected to a series of parallel springs or elastic members which are in turn connected to a foot end of the rectangular frame. The carriage rides on parallel rails or tracks mounted to the inside of the longer sides of the rectangular frame. This carriage typically includes a pair of spaced, padded,

upright shoulder stops and a head rest at one end to support the shoulders and head of the user when he/she is reclined on the carriage. An adjustable foot bar, foot support, or foot rest against which the user places his/her feet is removably mounted to the foot end of the rectangular frame. A spring support rod is positioned across the foot end between the tracks by a spring support bracket fastened to the frame. The rod typically fits in one of three or four recesses or slots in the support bracket, depending on the size or ability of the user. Alternatively, the spring support rod may be permanently fastened to the frame. The user can then push against the foot rest to move the carriage along the track away from the foot rest against spring tension to exercise the leg and foot muscle groups in accordance with prescribed movement routines. The carriage is prevented from moving close to the foot rest by a stop pin fastened to the top of each track, against which the carriage abuts when the carriage is at rest. Alternatively, the stop pin function may be performed by a spring anchor bar and carriage stop member such as is disclosed in my US Patent Nos. 6,120,425 and 6,338,704.

Many conventional reformer designs utilize a tubular anchor bar that slips into slanted slots in a bracket fastened to the rails at the foot end of the frame. The slots permit a user to adjust the longitudinal position of the anchor along the rails. This anchor bar is typically round in cross section. Thus, when a user decides to change the number of springs attached to the anchor bar, he or she must be careful not to remove all of the springs from the anchor bar at the same time, because without some spring tension on at least one hook, the anchor bar will simply rotate downward, positioning the hooks toward the floor. Then the user must use one hand to rotate the bar so that the hooks face the carriage, and use her other hand to fasten a spring onto one of the hooks. Another drawback with the conventional round bar and slotted bracket spring anchor design is that the brackets are separate components which must typically be installed at the foot end of the frame over the rails.

SUMMARY OF THE INVENTION

An embodiment of the present invention may be viewed as a reformer exercise apparatus that preferably includes a wheeled carriage having a generally flat top surface. The carriage is movably mounted on parallel track members attached to or forming sides of a generally rectangular frame which has a head end and a foot end. The carriage has a pair of shoulder stops mounted thereto and a head rest between the shoulder stops that extends outward from the carriage toward the head end of the frame. A plurality of elastic members connected between the foot end and the carriage elastically bias the carriage toward the foot end of the frame. A movable spring anchor bar and carriage stop assembly is incorporated into and between the track members at or adjacent the foot end of the rectangular frame to anchor the elastic members and position the carriage appropriately in relation to the anchor bar.

The track members are preferably tubes, each having preferably a rectangular cross section, that extend between the head end and the foot end of the frame. Alternatively, each of the track members could have a "top hat" or U shaped cross section such that, when fastened to the inside of the sides of the frame, the track has a horizontal track surface for the carriage support rollers and a vertical side wall for the carriage guide rollers to ride against. The spring anchor bar and carriage stop assembly in accordance with an embodiment of the present invention comprises the tubular track members and an elongated anchor bar having opposite ends that ride in elongated slots in facing vertical side walls of the tubular track members. More specifically, each track member has an elongated keyway slot formed adjacent the foot end of the track member in the inside wall of the track member. Each keyway slot has a series of spaced gear teeth that form spaced anchor bar stop portions. Each end of the anchor bar forms a key or tenon that rides within one of the elongated keyways such that the anchor bar is carried by and captured between the spaced apart track members by the keyed ends of the anchor bar.

When the anchor bar is captured in these slots, the anchor bar may be rotated about its longitudinal axis between a locked position against a set of the teeth and an unlocked position. These teeth or stop portions are shaped to permit rotation of the keyed end of the anchor bar between the locked and unlocked positions when both ends are aligned in corresponding stop portions. Between these stop portions, i.e., when the keyed ends are aligned parallel to the length of the elongated keyway slots, the anchor bar keyed ends slide so that a user can move the anchor bar back and forth toward and away from the foot end of the frame between the sequential stop portions of the keyways.

Another embodiment of the present invention is a reformer exercise apparatus in which the footbar may be positioned at either the head end or the foot end of the frame as well as various points in between via a support bracket assembly which slides in a T-slot along each of the frame sides and includes both horizontal and vertical foot bar positions along with various angular positions permitting the foot bar to be selectively positioned in a plurality of vertical positions from the carriage and near either the head or the foot end of the frame.

Other objects, features and advantages of the present invention will become apparent from a reading of the following detailed description when taken in conjunction with the accompanying drawing wherein a particular embodiment of the invention is disclosed as an illustrative example.

BRIEF DESCRIPTION OF THE DRAWING

Fig. **1** is a perspective view of a reformer exercise apparatus in accordance with embodiments of the present invention with portions of the carriage in the retracted position against the carriage stops of the anchor bar and carriage stop assembly.

Fig. **2** is a partial enlarged perspective view of the foot end of the reformer shown in FIG. **1**.

Fig. **3** is a separate perspective view of the foot bar support assembly shown in Figs. **1** and **2**.

Fig. **4** is a partial view of the reformer from inside the foot end of the reformer shown in FIG. **1** with the right side of the frame removed illustrating the anchor bar in the locked position in dashed lines and in the unlocked position in dotted lines.

Fig. **5** is a sectional view taken along the line 5-5 in Fig. **2**.

Fig. **6** is a separate perspective view of the anchor bar and carriage stop assembly in accordance with an embodiment of the present invention.

Fig. **7** is an exploded perspective view of the anchor bar and carriage stop assembly shown in Fig. **6**.

Fig. **8** is an end view of one side of the assembly shown in Fig. **6**.

DETAILED DESCRIPTION OF THE INVENTION

An exercise apparatus **10** in accordance with one embodiment of the present invention is shown in Figure **1**. Exercise apparatus **10** comprises a generally rectangular frame **12** having a head end **14** and a foot end **16** and a pair of parallel track or rail members **18**. The frame **12** may be a generally rectangular wood frame with the track or rail members **18** fastened to the insides of opposite side walls **20** of the frame **12**, or the rail members **18** themselves may constitute the parallel side walls of the frame **12**, as in a reformer having a metal tubular frame. The apparatus **10** further comprises a movable carriage **22** slidably or rollably disposed on the track members **18** for movement back and forth on the track members **18** between the head and foot ends **14** and **16** respectively.

Each of the track members **18** in the reformer apparatus **10** in accordance with the present invention is a metal tube that has a rectangular, and preferably a generally square cross-sectional shape. These metal tubes

are, in the embodiment illustrated, bolted or otherwise fastened to the inside surfaces of the side walls **20** of the frame **12**.

The carriage **22** includes a generally flat padded platform **24** for supporting a user's body and has a pair of spaced apart shoulder stops **26** fastened to the upper surface of the platform **24** adjacent the head end of the carriage **22** and a head rest **28** centered between the shoulder stops **26**. The head rest **28** may be hinged to the platform **24** such that it may be adjusted between at least a raised and a lowered position. The head rest extends outward from the platform **24** toward the head end of the frame **12**. Preferably the carriage **22** has four support wheels or rollers (not shown) which support the carriage **22** on the horizontal top surface of the track members **18** for movement back and forth on the track members **18** with minimal friction. The carriage **22** also has 4 guide rollers **25** (Fig. **5**) beneath the platform **24** adjacent the support rollers that roll along the vertical surface of the track members **18** to prevent binding of the carriage **22** on the track members **18** or against the frame side walls **20**. The guide and support rollers are mounted to a square tubular member **27** fastened to the underside of the platform **24**. A plurality of elastic resistance members **30**, typically springs as shown in the Figures, are hooked to or otherwise fastened between the foot end of the carriage **22** and the foot end **14** of the frame **12** such that the carriage **22** is biased toward the foot end of the frame **12**.

The foot bar assembly **32** comprises a generally U shaped foot bar **34**, preferably made of tubular aluminum, having a pair of spaced parallel leg portions **36** and **38** and a foot bar portion **40** therebetween and a pair of adjustable support bracket assemblies **42**. A padded sleeve over the foot bar portion **40** provides a cushion support for a user's foot. The foot bar support bracket assembly **42** is separately shown in perspective separated from the frame **12** in Fig. **3**.

The foot bar portion **40** has a generally S shaped recurve region **44** at each end thereof joining the leg portions **36** and **38** so that the straight portion of the foot bar portion **40** extends fully across the rail members **18** and, when the foot bar **34** is rotated so as to lie horizontally over the foot end **16**, the bar **34** clears the end **16**. The recurve region **44** further provides a more rigid structure to the foot bar **34** than a simple straight right angle bend between the leg and foot bar portions and provides clearance for a user's ankles when the users feet are spaced apart on the bar **34**. Referring now to Fig. **3**, at each distal end of the leg portions **36** and **38** is a transverse bearing sleeve **46**. A pivot pin **48** is fastened through the sleeve **46** into a threaded central bore in one of the support brackets **42**. A spring loaded stop pin **50** is fitted through a corresponding bore through each of the leg portions **36** and **38** spaced above the pivot sleeve **46**. This stop pin **50** is used to adjust the vertical position of the foot bar portion **40** of the bar **34** as more fully described below.

Each of the support bracket assemblies **42** comprises an elongated support bar **52** having a generally T shaped cross section sized complementary to a T-slot **54** mounted along the length of the frame side wall **20** so that the support bar **52** can slide back and forth in the T-slot **54** between the foot end **16** and the head end **14**. Fastened to the base of the T shaped cross section of the support bar **52** is a support plate **56** having an elongated base portion **58** extending along the base of the support bar **52** and an arcuate portion **53** extending parallel to the top of the support bar **52**. This arcuate portion **53** has a series of holes **55** spaced at different angles from the horizontal plane through the central pivot pin **48**. The holes **55** are positioned to receive the spring loaded stop pin **50** to lock the position of the foot bar **34** at a particular desired height above the rail members **18**. At least one of the holes **55** is directly above the pivot pin **48** providing a vertical position of the foot bar **34**. Another of the holes **55** is horizontally aligned with the central pivot pin **48** to completely collapse the foot bar **34** around the foot end **16** of the frame **12**. The stop pin **50** is activated by depressing a lever **57** that pivots to lift the

spring biased stop pin **50** out of one of the holes **55** to permit the foot bar **34** to be rotated to a desired position. This configuration permits the foot bar **34** to be positioned below the top of the reformer so that the entire upper surface of the reformer **10** may be utilized without the foot bar **34**.

At the other end of the base portion **58** of the support plate **56** is a spring loaded stop pin assembly **59**. The pin of the stop pin assembly **59** selectively fits into one of a plurality of horizontally spaced apart holes **51** in the T slot **54**. The support bar **52** of the foot bar assembly **32** slides along in the T-slot **54**. The spring loaded stop pin assembly **59** stops the support bar **52**, and thus the foot bar assembly **32**, at a desired position along the frame wall **20**. This configuration, with the T slot **54** extending the entire length of the frame **12**, facilitates a variety of new exercise possibilities that were heretofore impossible with a foot bar **34** positionable only adjacent a foot end of the frame of the reformer **10**.

The reformer **10** incorporating embodiments of the present invention is shown in more detail in Figure **2**. The springs **30** are attached to an anchor bar and carriage stop assembly **60** incorporated with the tracks **18** at the foot end **16**. The anchor bar and carriage stop assembly **60** adjustably anchors the springs **30** to an anchor bar **62** at the foot end **16** of the frame **12** and maintains a predetermined minimum distance between the carriage **22** and the anchor bar **62** via at least one carriage stop member **64** attached to the anchor bar **62**. The anchor bar **62** is an elongated straight bar or tube that may have a circular cross section. Alternatively, bar **62** may have a C shaped cross section or other elongated closed or open shape.

The anchor bar and carriage stop assembly **60** in accordance with an embodiment of the invention is separately shown in Figs. **6**, **7**, and **8**. The assembly **60** includes the pair of spaced track members **18** and the anchor bar **62**. The anchor bar **62** has an elongated carriage stop arm **64** adjacent each end of the anchor bar **62**. In the locked position, as will be explained in more

detail below with reference to Fig. **4**, the distal end of the stop arm **64** abuts against the carriage **22** to maintain a predetermined minimum distance between the anchor bar **62** and the carriage **22**. This stop arm **64** also acts as a lever to rotate the anchor bar from the locked position to the unlocked position to permit the anchor bar **62** to be repositioned along the slot **66**.

Each of the track members **18** has an elongated keyway slot **66** formed in the inside wall of the tubular track member **18** adjacent the foot end **16** of the frame **12**. The portion of each track member **18** forming the keyway slot **66** includes a plurality of spaced gear teeth **68** defining anchor bar stop or lock portions **70**. Each end of the anchor bar **62** includes a generally rectangular tenon **72** projecting axially as well as a projecting axle pin **74** extending from the distal end of the tenon **72**. As is best seen in Fig. **7**, the proximal end of the stop arm **64** has an elongated generally rectangular slot **76** complementary in shape to the tenon **72** to receive the tenon **72** therethrough such that the stop arm **64** is held against the base of the tenon **72** and cannot rotate about the anchor bar **62**. An elongated spacer arm **78** similarly has a slot sized to fit the spacer onto the tenon **72**. A guide wheel **80** is fastened onto the axle **74** with a screw **82**.

As can be seen in Fig. **7**, the stop arms **64** are assembled onto the tenons **72**, the spacers installed next onto the tenons **72**, and a guide wheel **80** is fastened to each of the axles **74**. Finally, a series of spring anchor hooks **83** are installed onto the anchor bar. The wheels **80** of this subassembly are then dropped into the slots **84** in the top wall of the track members **18** that join with the slots **66** so that the tenons **72** on the anchor bar **62** fit into the slots **66** to complete the assembly of the anchor bar and carriage stop assembly **60**. In this configuration, the guide wheels **80** ride between the top and bottom walls within the track members **18** to ensure that the tenons **72** are substantially centered in the slots **66** so that the anchor bar **62** will not bind in the track members **18** or slots **66**. This can best be seen in the end view of Fig. **8**.

Operation of the assembly is best shown with reference to Figs. **4** and **5**. In Fig. **4**, the foot end **16** of the apparatus **10** is shown with the anchor bar **62** positioned in both the locked position **86** and the unlocked position **88**. The dashed lines **86** represent the anchor bar **62** in the locked position with the tenon **72** rotated so as to engage the teeth **68**. In this position, note that the parallel sides of the tenon **72** are about **60** degrees from horizontal, thus preventing horizontal movement of the anchor bar **62**.

The dotted lines **88** represent the anchor bar **62** in the unlocked position, in which the parallel sides of the tenons **72** are parallel to the longitudinal axis of the slot **66**. In this rotational position, the anchor bar **62** is free to be moved from one lock portion to another lock portion. When the particular desired position is reached, the user can rotate the lock arms **64** clockwise to lock the anchor bar **62** in position and permit the carriage stop end **90** of the stop arms **64** to abut against a bumper **92** on the carriage **22** as is shown in Fig. **5**. In this position, when at least one spring **30** is attached to one of the hooks **83**, the anchor bar **62** is positively locked in position. In addition, even if no springs are attached, the anchor bar **62** is prevented from rotating upward or counterclockwise the offset mass of the assembly due to the elongated stop arms **64** projecting at right angles to the axis of rotation of the anchor bar **62**.

The present invention may be practiced otherwise than as specifically described above. Many changes, alternatives, variations, and equivalents to the various structures shown and described will be apparent to one skilled in the art. For example, each of the track members could have a "top hat" or U shaped cross section such that, when fastened to the inside of the sides of the frame, the track has a horizontal track surface for the carriage support rollers and a vertical side wall for the carriage guide rollers to ride against. The anchor bar and carriage stop assembly may be designed for use in a reformer apparatus as is disclosed in U.S. Patent Nos. 5,607,381 and 5,338,278. In this instance, the tracks form tubular frame rails and the anchor bar slots would

simply be formed in the tubular frame rails. The foot bar support assembly **42** would be mounted in T slots **54** fastened to the outside wall of the tubular frame rails so that the foot bar assembly **32** may be positioned anywhere along the length of the frame rails. The anchor bar **62** may have a cross sectional shape other than circular as shown and may be solid or hollow. The stop arms **64** may have different shapes than a flat sheet metal shape as shown. These members may be round and may be alternately fashioned from a single piece of material. Similarly, the foot rest **32** and the foot rest support **38** may be made other than as specifically shown and described. The wheel **80** may be replaced with a sliding block arrangement in the tubular track member **18**. Any such arrangement to keep the anchor bar tenon essentially centered in the slot **66** may be used. The anchor hooks **83** may be devices such as cap posts, hooks, rings, or other appropriately shaped members designed to receive or attach to one end of each of the springs **30**. Alternatively, the anchor devices may be machined into the anchor bar **62**.

Various other types of elastic resistance elements such as elastic cords may be substituted for springs **30**. The carriage **22** may ride in a pair of horizontally oriented "U" shaped channel tracks, with the slots **66** and **54** integrally formed in the bottom wall portion of the extrusion of the track itself. A still further variation may include a pair of track members that each have an upper vertical wall, a middle horizontal wall, and a lower vertical wall, similar to a horizontally oriented "Z" shape cross-section with the keyway slots **66** formed in the lower wall. In this case, the carriage would roll along the middle wall and the upper wall would be fastened to the frame **12** of the reformer apparatus **10**. Accordingly, the invention may be practiced other than as specifically described and shown herein with reference to the illustrated embodiments. The present invention is not intended to be limited to the particular embodiments illustrated but is intended to cover all such alternatives, modifications, and equivalents as may be included within the spirit and broad scope of the invention as defined by the following claims. All

patents, patent applications, and printed publications referred to herein are hereby incorporated by reference in their entirety.